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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/691,533 | 10/18/2000 | Charles David Bauman | RPS920000076US1 | 5366 |

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| EXAMINER | |
|---|---|
| TRUONG, BAO Q | |
| ART UNIT | PAPER NUMBER |
| 2187 | |

DATE MAILED: 12/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/691,533 | BAUMAN ET AL. | |
| | Examiner | Art Unit | |
| | Bao Q Truong | 2187 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *25 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *22* is/are allowed.

6)☒ Claim(s) *1,2,6,7,11,12,16,17 and 21* is/are rejected.

7)☒ Claim(s) *3-5,8,9,13-15 and 18-20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 October 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

***Response to Arguments***

1. Applicant's arguments, filed on 25 September 2003, have been fully considered and they are persuasive. All the rejections in the previous office action have been withdrawn.

2. The examiner acknowledges the applicant's submission of the amendment dated on 25 September 2003. At this point, claim 10 has been cancelled; claims 5, 15, and 20 have been amended; claim 22 has been added. Thus, claims 1-9 and 11-22 are pending in the application.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 6, 11, 16, and 21 are rejected under 35 U.S.C. 102(e) as being anticipate by Voigt et al. (U.S. Patent No. 6,055,604).

Referring to claim 1, Voigt teaches a method of handling a memory exhaustion condition in a data processing system having first and second regions of physical memory (see figure 2: elements 55 and 60), said method comprising:

detecting a memory exhaustion condition while said second region is mirroring at least part of said first region as detecting a page-full status of a ram log image area while a disk log area is mirroring the ram log image area for error recovery purpose (see figure 2, column 2: lines 3-11, and column 5: lines 22-28 and 41-46);

in response to said memory exhaustion condition, at least partially deactivating memory mirroring between said first and second regions; and augmenting said first region with at least part of said second region, such that said memory exhaustion condition is eliminated as posting unwritten contents of the ram log image area to disk log area without maintaining redundancy, in response to the page-full status of the ram log image area (see column 5: lines 47-61).

Referring to claim 6, Voigt discloses a data processing system comprising:

first and second regions of physical memory (see figure 2: elements 55 and 60);

detection logic (see figure 2: element 16) that detects a memory exhaustion condition while said second region is mirroring at least part of said first region as the raid management system detects a page-full status of a ram log image area while a disk log area is mirroring the ram log image area for error recovery purpose (see column 2: lines 3-11, and column 5: lines 22-28 and 41-46);

configuration logic (see figure 2: element 16) that, in response to said memory exhaustion condition, at least partially deactivates memory mirroring between said first and second regions and augments said first region with at least part of said second region, such that said memory exhaustion condition is eliminated as the raid management system posts unwritten contents of

the ram log image area to disk log area without maintaining redundancy, in response to the page-full status of the ram log image area (see column 5: lines 47-61).

Referring to claim 11, Voigt teaches the method, as in claim 1 above, in a computer environment. Inherently, the method can be implemented as a computer program, stored in a computer usable medium, encodes instructions to perform the method as in claim 1.

Referring to claim 16, Voigt discloses a memory management system that handles a memory exhaustion condition in a data processing system having first and second regions of physical memory (see figure 2: elements 55 and 60), said memory management system comprising:

detection logic (see figure 2: element 16) that detects a memory exhaustion condition while said second region is mirroring at least part of said first region as the raid management system detects a page-full status of a ram log image area while a disk log area is mirroring the ram log image area for error recovery purpose (see column 2: lines 3-11, and column 5: lines 22-28 and 41-46);

configuration logic (see figure 2: element 16) that, in response to said memory exhaustion condition, at least partially deactivates memory mirroring between said first and second regions and augments said first region with at least part of said second region, such that said memory exhaustion condition is eliminated as the raid management system posts unwritten contents of the ram log image area to disk log area without maintaining redundancy, in response to the page-full status of the ram log image area (see column 5: lines 47-61).

Referring to claim 21, Voigt discloses a data processing system comprising:

first and second regions of physical memory (see figure 2: elements 55 and 60);

detection means (see figure 2: element 16) for detecting a memory exhaustion condition while said second region is mirroring at least part of said first region as the raid management system detects a page-full status of a ram log image area while a disk log area is mirroring the ram log image area for error recovery purpose (see column 2: lines 3-11, and column 5: lines 22-28 and 41-46);

configuration means (see figure 2: element 16), responsive to said memory exhaustion condition, for at least partially deactivating memory mirroring between said first and second regions and augmenting said first region with at least part of said second region, such that said memory exhaustion condition is eliminated as the raid management system posts unwritten contents of the ram log image area to disk log area without maintaining redundancy, in response to the page-full status of the ram log image area (see column 5: lines 47-61).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 2, 7, 12, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Voigt et al. (U.S. Patent No. 6,055,604) in view of Blumenau (U.S. Patent No. 6,151,665).

As to claim 2, Voigt teaches the method as in claim 1 above. And Voigt further teaches that step of detecting a memory exhaustion condition comprises determining that said first region lacks sufficient available capacity to accommodate current requirement for real memory as determining that the ram log image area lacks sufficient available capacity, due to the page-full status, to retain the incremental changes to a NVRAM map (see column 2: lines12-16).

However, Voigt does not clearly teach that said data processing system compressing real memory into said first region of physical memory and that step of augmenting said first region comprises compressing at least part of said required real memory into said at least part of said second region.

Blumenau teaches a method of storing data in a mirroring storage system wherein said data is stored in a compressed format (see figure 13 and column 20: lines 5-13).

It would have been obvious to one having an ordinary level of skill in the art at the time the invention was made to further configure the method taught by Voigt such that said data processing system compressing real memory into said first region of physical memory and said step of augmenting said first region comprises compressing at least part of said required real memory into said at least part of said second region. This would have been obvious because Blumenau teaches that data is stored into main memory in a compressed format for the purpose of gaining high storage efficiency (see column 20: lines 39-42).

As to claim 7, Voigt discloses the system as in claim 6 above. And Voigt further discloses that said detection logic comprises a memory controller that detects a memory exhaustion condition by determining that said first region lacks sufficient available capacity to accommodate current requirement for real memory as the raid management system determines that the ram log image area lacks sufficient available capacity, due to the page-full status, to retain the incremental changes to a NVRAM map (see column 2: lines12-16).

However, Voigt does not clearly disclose that said data processing system compresses real memory into said first region of physical memory and that configuration logic comprises a memory manager that augments said first region by configuring said memory controller to compress at least part of said required real memory into said at least part of said second region.

Blumenau discloses a system of storing data in a mirroring storage system wherein said data is stored in a compressed format (see figure 13 and column 20: lines 5-13).

It would have been obvious to one having an ordinary level of skill in the art at the time the invention was made to further configure the system taught by Voigt such that said data

processing system compresses real memory into said first region of physical memory and that configuration logic comprises a memory manager that augments said first region by configuring said memory controller to compress at least part of said required real memory into said at least part of said second region. This would have been obvious because Blumenau discloses that data is stored into main memory in a compressed format for the purpose of gaining high storage efficiency (see column 20: lines 39-42).

As to claim 12, Voigt teaches the method, as in claim 2 above, in a computer environment. Inherently, the method can be implemented as a computer program, stored in a computer usable medium, encodes instructions to perform the method as in claim 2.

As to claim 17, Voigt discloses the system as in claim 16 above. And Voigt further discloses that said detection logic comprises a memory controller that detects a memory exhaustion condition by determining that said first region lacks sufficient available capacity to accommodate current requirement for real memory as the raid management system determines that the ram log image area lacks sufficient available capacity, due to the page-full status, to retain the incremental changes to a NVRAM map (see column 2: lines12-16).

However, Voigt does not clearly disclose that said data processing system compresses real memory into said first region of physical memory and that configuration logic comprises a memory manager that augments said first region by configuring said memory controller to compress at least part of said required real memory into said at least part of said second region.

Blumenau discloses a system of storing data in a mirroring storage system wherein said data is stored in a compressed format (see figure 13 and column 20: lines 5-13).

It would have been obvious to one having an ordinary level of skill in the art at the time the invention was made to further configure the system taught by Voigt such that said data processing system compresses real memory into said first region of physical memory and that configuration logic comprises a memory manager that augments said first region by configuring said memory controller to compress at least part of said required real memory into said at least part of said second region. This would have been obvious because Blumenau discloses that data is stored into main memory in a compressed format for the purpose of gaining high storage efficiency (see column 20: lines 39-42).

7. Claims 1, 6, 11, 16, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohran (U.S. Patent No. 6,397,307 B2) in view of Burkes et al. (U.S. Patent No. 5,542,065).

Referring to claim 1, Ohran teaches a method for mirroring data in a data processing system having a first region and a second region of physical memory (see figure1), wherein said second region mirroring the first region (see Abstract and column 9: lines 6-28).

However, Ohran does not clearly teach steps of: (1) detecting a memory exhaustion condition; (2) in response to said memory exhaustion condition, at least partially deactivating memory mirroring between said first and second regions; and (3) augmenting said first region with at least part of said second region, such that said memory exhaustion condition is eliminated.

Burkes teaches a method of storing redundant data similar to that of Blumenau. Burkes further teach steps of:

(1) detecting a memory exhaustion condition as determining if the data storage system approaches full capacity;

(2) in response to said memory exhaustion condition, at least partially deactivating memory mirroring between said first and second regions; and (3) augmenting said first region with at least part of said second region such that said memory exhaustion condition is eliminated as in response to exhaustion condition of a mirror parity area, deactivating redundancy level in unused portions of a parity area and converting these unused portions of the parity area to the mirror area to meet all demand by the user (figure 8: steps 90, 92, 94, 96, and 100; column 12: lines 21-28, lines 44-67, and column 13: lines 1-6).

It would have been obvious to one having an ordinary level of skill in the art at the time the invention was made to include, in the method taught by Ohran, steps of (1) detecting a memory exhaustion condition while said second region is mirroring at least part of said first region; (2) in response to said memory exhaustion condition, at least partially deactivating memory mirroring between said first and second regions; and (3) augmenting said first region with at least part of said second region, such that said memory exhaustion condition is eliminated. This would have been obvious because Burkes clearly teaches that the method allows migration of data between the two areas to optimize performance and reliability (see Abstract).

Referring to claim 6, Ohran discloses a data processing system comprising a first and a second region of physical memory (see figure1), wherein said second region mirroring the first region (see Abstract and column 9: lines 6-28).

However, Ohran does not clearly disclose:

(1) detection logic that detects a memory exhaustion condition;

(2) configuration logic that, in response to said memory exhaustion condition, at least partially deactivates memory mirroring between said first and second regions and augments said first region with at least part of said second region, such that said memory exhaustion condition is eliminated.

Burkes discloses a data processing system similar to that of Blumenau. Burkes further discloses:

(1) detection logic that detects a memory exhaustion condition as a raid management system detects if the data storage system approaches full capacity (see figure 1: element 16 and column 4: lines 3-15);

(2) configuration logic that, in response to said memory exhaustion condition, at least partially deactivates memory mirroring between said first and second regions and augments said first region with at least part of said second region, such that said memory exhaustion condition is eliminated as in response to exhaustion condition of a mirror parity area, the raid management system deactivates redundancy level in unused portions of a parity area and converts these unused portions of the parity area to the mirror area to meet all demand by the user (figure 8: steps 90, 92, 94, 96, and 100; column 12: lines 21-28, lines 44-67, and column 13: lines 1-6).

It would have been obvious to one having an ordinary level of skill in the art at the time the invention was made to include, in the system taught by Ohran, (1) detection logic that detects a memory exhaustion condition while said second region is mirroring at least part of said first region; (2) configuration logic that, in response to said memory exhaustion condition, at least partially deactivates memory mirroring between said first and second regions and augments said first region with at least part of said second region, such that said memory exhaustion condition is eliminated. This would have been obvious because Burkes clearly discloses that the system allows migration of data between the two areas to optimize performance and reliability (see Abstract).

Referring to claim 11, Ohran and Burkes teach their methods, as in claim 1 above, in a computer environment. Inherently, their methods can be implemented as a computer program, stored in a computer usable medium, encodes instructions to perform the methods as in claim 1.

Referring to claim 16, Ohran discloses a memory management system comprising a first and a second region of physical memory (see figure1), wherein said second region mirroring the first region (see Abstract and column 9: lines 6-28).

However, Ohran does not clearly disclose:

(1) detection logic that detects a memory exhaustion condition;

(2) configuration logic that, in response to said memory exhaustion condition, at least partially deactivates memory mirroring between said first and second regions and augments said first region with at least part of said second region, such that said memory exhaustion condition is eliminated.

Burkes discloses a data processing system similar to that of Blumenau. Burkes further discloses:

(1) detection logic that detects a memory exhaustion condition as a raid management system detects if the data storage system approaches full capacity (see figure 1: element 16 and column 4: lines 3-15);

(2) configuration logic that, in response to said memory exhaustion condition, at least partially deactivates memory mirroring between said first and second regions and augments said first region with at least part of said second region, such that said memory exhaustion condition is eliminated as in response to exhaustion condition of a mirror parity area, the raid management

system deactivates redundancy level in unused portions of a parity area and converts these unused portions of the parity area to the mirror area to meet all demand by the user (figure 8: steps 90, 92, 94, 96, and 100; column 12: lines 21-28, lines 44-67, and column 13: lines 1-6).

It would have been obvious to one having an ordinary level of skill in the art at the time the invention was made to include, in the system taught by Ohran, (1) detection logic that detects a memory exhaustion condition while said second region is mirroring at least part of said first region; (2) configuration logic that, in response to said memory exhaustion condition, at least partially deactivates memory mirroring between said first and second regions and augments said first region with at least part of said second region, such that said memory exhaustion condition is eliminated. This would have been obvious because Burkes clearly discloses that the system allows migration of data between the two areas to optimize performance and reliability (see Abstract).

Referring to claim 21, Ohran discloses a data processing system comprising a first and a second region of physical memory (see figure1), wherein said second region mirroring the first region (see Abstract and column 9: lines 6-28).

However, Ohran does not clearly disclose:

(1) detection means for detecting a memory exhaustion condition;

(2) configuration means that, responsive to said memory exhaustion condition, for at least partially deactivating memory mirroring between said first and second regions and augmenting said first region with at least part of said second region, such that said memory exhaustion condition is eliminated.

Burkes discloses a data processing system similar to that of Blumenau. Burkes further discloses:

(1) detection means for detecting a memory exhaustion condition as a raid management system detects if the data storage system approaches full capacity (see figure 1: element 16 and column 4: lines 3-15);

(2) configuration means, responsive to said memory exhaustion condition, for at least partially deactivating memory mirroring between said first and second regions and augmenting said first region with at least part of said second region, such that said memory exhaustion condition is eliminated as in response to exhaustion condition of a mirror parity area, the raid management system deactivates redundancy level in unused portions of a parity area and converts these unused portions of the parity area to the mirror area to meet all demand by the user (figure 8: steps 90, 92, 94, 96, and 100; column 12: lines 21-28, lines 44-67, and column 13: lines 1-6).

It would have been obvious to one having an ordinary level of skill in the art at the time the invention was made to include, in the system taught by Ohran, (1) detection means for detecting a memory exhaustion condition while said second region is mirroring at least part of said first region; (2) configuration means, responsive to said memory exhaustion condition, for at least partially deactivating memory mirroring between said first and second regions and augmenting said first region with at least part of said second region, such that said memory exhaustion condition is eliminated. This would have been obvious because Burkes clearly discloses that the system allows migration of data between the two areas to optimize performance and reliability (see Abstract).

8. Claims 2, 7, 12, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohran (U.S. Patent No. 6,397,307 B2) in view of Burkes et al. (U.S. Patent No. 5,542,065) as applied to claims 1, 6, 11, and 16 above, and further in view of Blumenau (U.S. Patent No. 6,151,665).

As to claim 2, Ohran and Burkes teach their methods as in claim 1 above.

However, both Blumenau and Burkes do not clearly teach that said data processing system compressing real memory into said first region of physical memory and said step of augmenting said first region comprises compressing at least part of said required real memory into said at least part of said second region.

Blumenau teaches a method of storing data in a mirroring storage system wherein said data is stored in a compressed format (see figure 13 and column 20: lines 5-13).

It would have been obvious to one having an ordinary level of skill in the art at the time the invention was made to further configure the methods taught by Ohran and Burkes such that said data processing system compressing real memory into said first region of physical memory and said step of augmenting said first region comprises compressing at least part of said required real memory into said at least part of said second region. This would have been obvious because Blumenau teaches that data is stored into main memory in a compressed format for the purpose of gaining high storage efficiency (see column 20: lines 39-42).

As to claim 7, Ohran and Burkes disclose their systems as in claim 6 above.

However, both Blumenau and Burkes do not clearly disclose that said data processing system compressing real memory into said first region of physical memory and that said configuration logic comprises a memory manager that augments said first region by configuring said memory controller compressing at least part of said real memory into said at least part of said second region.

Blumenau discloses a system of storing data in a mirroring storage system wherein said data is stored in a compressed format (see figure 13 and column 20: lines 5-13).

It would have been obvious to one having an ordinary level of skill in the art at the time the invention was made to further configure the systems taught by Ohran and Burkes such that said data processing system compressing real memory into said first region of physical memory and said configuration logic comprises a memory manager that augments said first region by configuring said memory controller compressing at least part of said real memory into said at least part of said second region. This would have been obvious because Blumenau discloses that data is stored into main memory in a compressed format for the purpose of gaining high storage efficiency (see column 20: lines 39-42).

As to claim 12, Ohran and Burkes teach their methods, as in claim 2 above, in a computer environment. Inherently, their methods can be implemented as a computer program, stored in a computer usable medium, encodes instructions to perform the methods as in claim 2.

As to claim 17, Ohran and Burkes disclose their systems as in claim 16 above.

However, both Blumenau and Burkes do not clearly disclose that said data processing system compressing real memory into said first region of physical memory and that said configuration logic comprises a memory manager that augments said first region by configuring said memory controller compressing at least part of said real memory into said at least part of said second region.

Blumenau discloses a system of storing data in a mirroring storage system wherein said data is stored in a compressed format (see figure 13 and column 20: lines 5-13).

It would have been obvious to one having an ordinary level of skill in the art at the time the invention was made to further configure the systems taught by Ohran and Burkes such that said data processing system compressing real memory into said first region of physical memory and said configuration logic comprises a memory manager that augments said first region by configuring said memory controller compressing at least part of said real memory into said at least part of said second region. This would have been obvious because Blumenau discloses that data is stored into main memory in a compressed format for the purpose of gaining high storage efficiency (see column 20: lines 39-42).

***Allowable Subject Matter***

9. Claims 3-5, 8-9, 13-15, and 18-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. Claim 22 has been allowed.

***Conclusion***

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bao Q Truong whose telephone number is (703) 308-7090. The examiner can normally be reached on Monday-Friday from 8:30 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald A Sparks, can be reached on (703) 308-1756. The fax phone number for the organization where this application or proceeding is assigned is (703) 746-7239.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

BAO QUOC TRUONG
BT
Patent Examiner
November 26, 2003

Donald Sparks
Supervisory Patent Examiner
Technology Center 2100